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Child- and school-level predictors of children's bullying behaviour: A multilevel analysis in 648 primary schools

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Abstract

A great deal of bullying behaviour takes place at school, however, existing literature has predominantly focused on individual characteristics of children associated with bullying with less attention on school-level factors. The current study, comprising 23,215 children (51% boys) recruited from year 4 or year 5 (M = 9.06 years, SD = .56 years) from 648 primary schools in England, aimed to examine the independent and combined influence of child- and school-level predictors on bullying behaviour in primary school. Children provided information on bullying behaviour and school climate. Demographic characteristics of children were obtained from the National Pupil Database, and demographic characteristics of schools were drawn from EduBase. Multi-level logistic regression models showed that individual child gender, ethnicity, deprivation and special educational needs status all predicted bullying behaviour. Of the school-level predictors, only overall school deprivation and school climate were predictive of bullying behaviour once child-level predictors were taken into account. There was a significant interaction between child- and school-level deprivation; high-deprivation schools was a risk factor for bullying only for children that came from non-deprived backgrounds, whereas deprived children reported engaging in bullying behaviour irrespective of school-level deprivation. Given the independent and combined role of child- and school-level factors for bullying behaviour, the current study has implications for targeted school interventions to tackle bullying behaviour, both in terms of identifying high-risk children and identifying high-risk schools.

Keywords: bullying; school composition; school climate; multilevel analysis

Educational Impact And Implications Statement

The majority of bullying behaviour takes place at school, however, the existing literature has mostly focused on child characteristics associated with bullying, and considerably less attention has been paid to the characteristics of children's schools that are associated with bullying. We analyse data from 23,215 children form 648 primary schools to identify both child and school characteristics that predict children's bullying behaviour. A number of child characteristics were found to predict greater bullying behaviour (such as being a boy and experiencing poverty). Of the school characteristics, aggregated poverty level and sense of school connectedness were associated with bullying behaviour. Additionally, the statistical combination of child and school characteristics were also shown to predict bullying, such that children not experiencing poverty attending schools with high poverty levels were at particular risk of engaging in bullying behaviour. The current study has important implications for the design and implementation of targeted school interventions to tackle bullying behaviour, both in terms of identifying and targeting high-risk children and high-risk schools.

Child- and school-level predictors of children's bullying behaviour: A multilevel analysis in 648 primary schools

Bullying at school is a significant problem and has a far-reaching negative influence on later psychosocial adjustment (e.g., Fisher et al., 2012; Glew, Fan, Katon, Rivara, & Kernic, 2005), educational attainment (e.g., Glew, Fan, Katon, Rivara, & Kernic, 2005) and physical health (e.g., Takizawa, Maughan, & Arseneault, 2014). In order to understand the factors that predict bullying behaviour, the extant literature has, for the most part, focused on individual characteristics of children, such as age, gender, externalising problems and social cognitions (Cook, Williams, Guerra, Kim, & Sadek, 2010). However, bullying behaviour necessarily takes place in a social context and, bullying, by definition, is a relational process established over time (Salmivalli, 2010), thus contextual factors, including school characteristics, are likely to play a key role in bullying behaviour (Bradshaw, Sawyer, & O'Brennan, 2009; Cook et al., 2010). Understanding the school-level features predictive of bullying is especially pertinent given that the majority of bullying interventions stress the importance of changing the school environment (e.g., Olweus & Limber, 2010). However, relatively little systematic attention has been given to these features. In particular, very little focus has been placed on understanding the potential interaction between child- and school level predictors of bullying behaviour. The current study examines both child- and school-level risk factors for bullying behaviour in a large cohort of primary school-aged children in order to better understand the predictors of bullying behaviour in this population.

Understanding bullying in primary school is important, as these years are a critical developmental stage where children learn to establish and maintain peer relationships (e.g., Fink, Begeer, Hunt & de Rosnay, 2014). Notably, studies with

children and retrospective studies with adults have both shown that bullying experiences typically emerge during the primary school years, making this period a crucial time for understanding the child- and school factors associated with bullying behaviour (Bowes et al., 2009; Wolke, Woods, Bloomfield, & Karstadt, 2000). Furthermore, bullying increases during childhood, peaking in early adolescence suggesting that prevention programs targeting children at the end of primary prior to this peak may be the most effective at curbing this increase (Guerra et al. 2011). This suggests that understanding predictors of bullying behaviours in these earlier years may be critical to breaking a cycle of bullying that can perpetuate through adolescence (Smith, 2010).

School-level Predictors

School is a key context for bullying behaviour during childhood (Saarento, Kärnä, Hodges, & Salmivalli, 2013), and recent empirical research has begun to acknowledge the important role played by the child's specific school context for the prediction of bullying behaviour (Bowes et al., 2009;Bradshaw et al., 2009; Khoury-Kassabri, Benbenishty, Avi Astor, & Zeira, 2004; Saarento, Garandeau, & Salmivalli, 2015; Vervoort, Scholte, & Overbeek, 2010; Wolke, Woods, Stanford, & Schulz, 2001; Waasdorp, Pas, O'Brennan & Bradshaw, 2011). This research has shown that between 1% and 7% of variability in bullying behaviour is accounted for by the classroom or school group (Bradshaw et al., 2009; Kärnä, 2013; Kärnä et al., 2011), compared to around 20% for academic attainment and under 5% for mental health variables (Hale et al., 2014). A range of school-level characteristics may be considered in relation to bullying, including school composition, school climate, and the presence of bullying prevention and victim support strategies. The first and second of these aspects will be the focus of the current research, and their implications for

interventions will be discussed.

The most commonly studied school composition factors that predict bullying include: gender distribution, classroom or school size, proportion of ethnic minority students, and socio-economic indices (see Kasen, Berenson, Cohen, & Johnson, 2004 for reviews; Saarento et al., 2015). However, results from these studies have been inconsistent. For example, while some research has shown that a greater proportion of boys within a school is associated with a greater bullying (e.g., Khoury-Kassabri et al., 2004) other studies have failed to find such an effect (e.g., Saarento et al., 2013). Similar discrepancies in the extant literature are also observed for classroom or school size, with different studies showing an advantage of either larger or smaller schools (or classrooms) for bullying (e.g., Bowes et al., 2009; Khoury-Kassabri et al., 2004; Saarento et al., 2013; Whitney & Smith, 1993). With respect to ethnic minority composition, some studies have found no association between proportion of students from ethnic minorities (e.g., Whitney & Smith, 1993) while others have found interactions between classroom composition of ethnic minorities and individual children's minority status as predictive of bullying (e.g., Vervoort et al., 2010). Finally, students from low socio-economic status (SES) schools have been found to report greater bullying (e.g., Bradshaw et al., 2009; Whitney & Smith, 1993), while others have not found such an association (e.g., Ma, 2002). It is clear, therefore, from the extant literature, that the prediction of bullying from demographic school-level variables has produced varied findings. These differences may be due to diversity in bullying measurement across studies, differences across studies in controlling for child-level predictors and the age-group of the participants (primary or secondary school). In addition, few studies include a large number of schools, meaning that they likely lack power to detect between-school variations.

Contrary to the findings for school-level demographic factors, school climate, frequently operationalised as the extent to which students on average feel connected to their school and have positive perceptions of school (and their teachers), does appear to be consistently associated with bullying behaviour (e.g., Bosworth, Espelage, & Simon, 1999; Bradshaw, Waasdorp & Lindstrom Johnson, 2014; Guerra, Williams, & Sadek, 2011; Kasen et al., 2004). For example, in schools where victimisation is a problem, children tend to report less positive perceptions of their school climate (Baker, 1998; Ma, 2002). Furthermore, children who report bullying others also report significantly more negative perceptions of and feel less connected to their school (Espelage & Swearer, 2003; Nansel et al., 2001). It is worth noting that the majority of this work has been conducted within North America, and it is not clear to what extent it will apply in other school contexts, such as those in Europe. These findings are, however, encouraging as they suggest that the malleable factor of school climate plays a role in the extent to which schools experience bullying, implying that providing schools with support to improve their school climate will also have a positive impact on bullying behaviour.

An important distinction may be made between school composition and school climate as predictors of bullying behaviour. School composition relates to the characteristics and mix of the students within a given school, and as such is a non-malleable characteristic of the school. Although it is important to understand the impact of these variables on bullying behaviour, they are not subject to direct intervention. However, studying the influence of school composition offers an insight into the environment that facilitates bullying behaviour and where intervention can be targeted. School climate, commonly representing aggregated individual child perceptions of their school, conversely, is a dynamic aspect of schools that is

malleable to intervention (Brault, Janosz, & Archambault, 2014), and interventions aiming to improve school-wide culture have been shown to decrease the incidence of behaviour problems (Bradshaw, Waasdorp & Leaf, 2012).

Child-level Predictors

When considering school-level characteristics it is essential to understand if these school-level factors make an impact beyond the individuals that make up the school. Many child demographic factors have been implicated in bullying behaviour. Most consistently gender has been shown to be associated with bullying behaviour, with boys engaging in higher amounts of bullying behavior than girls (Bosworth et al., 1999; Cook et al., 2010). Children's socio-economic status has also been found to be associated with bullying behavior although this result is not always consistent (see Wolke et al., 2001), highlighting the need to further explore this result and examine if it is child-level or school-level disadvantage that is more closely associated with bullying behaviour. Similarly, ethnicity has also sometimes been shown to be associated with bullying behaviour (e.g., Wolke et al., 2001) although again, this finding is not always consistent (e.g., Bosworth et al., 1999). As such, greater clarity is also needed on the individual demographic characteristics that put children at risk of exhibiting bullying behaviour.

The Current Study

Given the limitations of the existing literature outlined above, the current study aimed to make two advances: (1) to examine school-level influences on bullying behaviour in a large cohort of primary schools (648 schools), giving power to detect school-level effects; (2) to explore the interplay between child- and school-level influences. Specifically, we explored the role of school size, school gender balance, proportion of children from minority ethnic groups, school deprivation and

school climate as predictors of bullying behaviour over and above individual child-level demographic characteristics (gender, deprivation, ethnicity, special educational needs status, English as an additional language and year group). Given the broad nature of school climate, we focused specifically on school supportiveness and school connectedness, which are most commonly examined within the bullying literature. By employing a multi-level modelling approach and including both child- and school-level factors simultaneously, the current study is able to assess the relative independent and combined impact of each for bullying behaviour. Understanding the unique contribution of school-level factors that influence bullying has reaching implications for school-based interventions designed to curtail bullying in schools and promote a more positive school environment and can, furthermore, provide guidance for targeting bullying interventions to those schools that need them most.

Method

Participants

Schools. A total of 648 primary schools participated in the current study. Schools were selected by their local authority to participate in a larger study examining child mental health across England (Wolpert et al., 2011). All schools were state-maintained (i.e., public schools), in England, and provided an average of 35.80 participants per school (*SD* = 18.65). Details of school characteristics are presented in Table 1. Schools were drawn from 99 (of 351) local authorities across England, and the geographical spread of these local authorities was representative of the whole country. Out of the 648 schools in the study, one was a single sex boys schools and the remaining 647 were mixed sex schools. Eight schools were focused on students with special educational needs.

Children. The study included 23,215 participants (51% boys) from Year 4 and Year 5 (M_{age} = 9.06 years, SD = .56 years). All children in Year 4 or Year 5 at the selected schools were invited to participate and consent was sought from parents beforehand by post and children provided assent prior to completing measures.

With respect to the ethnicity of participants in the current study, 75% were recorded as White, with the remainder being Asian (12%), Black (7%), mixed (4%), or other ethnic groups/unclassified (2%). Comparing these proportions to the overall proportions of children from black and ethnic minority groups (BME) for the whole school (i.e., all year levels of participating schools; see Table 1) shows that the subsample of Year 4 and 5 students in the current study largely mirror the overall school composition. Furthermore, when comparing the proportion of BME students in our current sample to all students attending primary schools across England (Department for Education, 2009), again, shows that our sample is representative of the total primary school population.

Socio-economic status (SES) was based on children's eligibility for free school meals (FSM; Hobbs & Vignoles, 2010). Of participating children, 24% were eligible for Free School Meals (FSM), which is higher than the national average of 16% (Department for Education, 2009).

Finally, 20% of the sample knew English as an additional language (EAL) and 28% were identified as having any special educational needs (SEN).

[Table 1 here]

Procedure

Data were collected from three sources. First, children completed self-report measures using a secure online system during their usual school day. A description of the full battery of measures and study design is reported elsewhere (Wolpert et al.,

2011). Teachers facilitated the completion of the survey and were given a standardized information sheet to read to participating children, including the aims of the study, confidentiality and the ability to withdraw at any time.

All items were administered to children online using a bespoke system designed to be easy to read and child-friendly with large font sizes. Recorded spoken accompaniment for all instructions, questionnaire items and response options was provided. The questionnaire items were presented to all students in the same order, with the bullying item preceding the school climate items.

Self-report measures were complemented with two sets of routinely recorded information. Child demographic information was obtained using the National Pupil Database which was linked to each participant. In addition, school level information was drawn from EduBase, a publically available database of school characteristics in England.

Instruments

Bullying behaviour. Participants reported on their own bullying behaviour by indicating "never", "sometimes" or "always" in response to the item "I bully others". This single item was included amongst a battery of measures (see Wolpert et al., 2011). Given only 2% of children responded "always" to this item, responses for "sometimes" and "always" were collapsed for all analyses (12%). As such, the measure indicates self-report of any bullying behavior, rather than the frequency of bullying behaviours.

To examine the validity of the single global bullying item two sets of analyses were conducted. First, children's self-reported bullying in the current study (12% of children report engaging in bullying at least sometimes) is comparable to the frequency of self-reported bullying reported in the literature (between 8% and 15% in

late primary school/middle school pupils (e.g., Guerra et al., 2011; Nansel et al., 2001). Second, it is well documented that children who engage in bullying behaviours are also more likely to score highly on measures assessing externalising behaviours (e.g., Cook, Williams, Guerra, Kim, & Sadek, 2010). As such, we examined whether this association holds for the current sample using the teacher-reported conduct problems subscale of the Strengths and Difficulties Questionnaire (Goodman, 1997) which was available for a non-random subset of the sample (N = 2197) and the behavioural problems subscale of the Me and My School Questionnaire (Deighton et al., 2013), a validated self-reported measure of children's difficulties. Correlational analyses show a significant positive association between children's self-reported bullying using the single item and both teacher-reported ($r = .32$, $p < 0.001$) and self-reported ($r = .46$, $p < 0.001$) externalising problems. For contrast, the correlation between the bullying item and children's teacher-rated ($r = .09$) and self-reported ($r = .015$) emotional problems were considerably lower.

Child demographic characteristics. Child characteristics included in analysis were gender, socio-economic deprivation (FSM eligibility), ethnicity (White, Black, Asian, mixed, other/unclassified), special educational need (whether or not children were receiving special educational provision), language (whether or not English was an additional language for the child), and year group (Year 4 or Year 5).

School demographic characteristics. Routinely collected data at the school level included measures of school size (number of students), school gender (proportion of girls) and school deprivation (proportion of FSM eligible students). In addition, for each school we aggregated child-level data to estimate the school-level percentage of children from ethnic minority backgrounds (school ethnicity), percentage of children with a special educational need (school SEN) and percentage

of children with English as an additional language (school EAL). Note that the latter therefore represent the demographic characteristics of the year group in question rather than the entire school. Table 1 presents descriptive information on the school characteristics.

School climate. All participants completed a self-report measure of school climate. School climate is a broad construct, and the current 7-item measure was derived specifically from measures of school supportiveness and school as a community (connectedness); including, 1) staff support and care subscale of the School as Caring Community profile (Lickona & Davidson, 2003), 2) school-supportiveness subscale of the Sense of School Community Scale (Battistich & Hom, 1997) and 3) the My School scale of the Iowa Youth and Families Project Ratings Scale (Melby et al., 1993). For example, items included, "We can talk to teachers about problems" and, "At this school we care about each other". Participants responded by selecting one of three response options ("never", "sometimes", "always"). Scores ranged between 0 and 14, with higher scores indicating more positive perceptions of school climate. Cronbach's alpha (α =.75) demonstrates that the scale has adequate internal reliability. To ensure that these items were indeed assessing a single construct, principal component and factor analysis were conducted on the 7 items. This analysis clearly indicated the existence of a single 'school climate' factor with all items loading above 0.4 onto this single factor (Stevens, 1992). Average factor loading for individual items was 0.55, and ranged between 0.41 and 0.61.

Data Analyses

Missing data. The analysed sample represents 95% of the possible 24,565 cases who were included in the study. Of the 1,350 cases that were excluded from

analysis: 294 cases did not respond to the bullying item, 221 cases were excluded as they were missing child-level socio-demographic information (e.g., SEN, Deprivation, Language) in the National Pupil database and another 835 cases were excluded as there was no school level information available. A comparison of those who did (n = 23,215) and did not (n = 294) respond to the bullying item indicates that those who did not respond were significantly more likely to be of Asian (Odds ratio (OR) = 1.65) or Black (OR = 2.16) ethnicity and be identified as having special educational needs (OR = 1.19). A comparison of those children who were missing the NPD data (demographics) indicates that a greater number of children with missing NPD data reported bullying (19%), compared to the 12% in the analysed sample.

Statistical models. Following descriptive statistics, analyses were carried out in stages to estimate the amount of variation in bullying behaviour accounted for by schools. To account for students nested within schools, all analysis was conducted using multilevel modelling with ML estimation. The models were constructed such that the child- and school- level predictors are modelled as fixed effects and we specify random effects at the school level as this is the cluster variable. To support interpretation of the interaction terms grand mean centring was used to centre the school- and child-level continuous variables in the models.

First, the baseline model (model 1) was conducted which estimated overall school-level variance in bullying behaviour. Second, child-level predictors were included in the model (model 2). Third, school-level demographic (non-malleable) predictors were added to the model (model 3), so that the degree to which school composition variables are able to predict bullying behaviour over and above child-level variables could be elucidated. Finally, school climate was included as a predictor of bullying behaviour (model 4). School climate was added on a separate

step to determine if this malleable school-level factor predicts bullying behaviour over and above non-malleable, demographic school factors.

At each stage incremental model fit was estimated to assess if the additional predictors explained significantly more of the variation in bullying behaviours. For each model we report the random effect parameter and the intra-class correlation (ICC) which represents the amount of variance in bullying accounted for by schools. By examining the ICC in consecutive models, the amount of variance previously attributed to schools, that is explained by the additional variables can be understood. Two further models were then run to examine child- by school-level interactions, model 5A examines demographic interactions between children and schools, while model 5B examines interactions between child-level variables and school climate.

Given the large sample size in the current study, the alpha rate for significance was set at $p < 0.01$ in order to minimise the likelihood of type I error. All analyses were conducted in STATA version 12 (StataCorp, 2011).

Results

Results are presented in three parts. First, descriptive statistics are presented for key study variables. Second, multilevel logistic regression models with children nested within schools were used to explore child- and school-level predictors of children's self-reported bullying behaviour. Finally, we explored the impact of interactions between child-level and school-level characteristics for predicting children's bullying behaviour.

Descriptive Statistics

Proportions of children responding "never" and "sometimes/always" to engaging in bullying behaviour are presented in Table 2. There are several noteworthy

features of Table 2. First, 17% of boys and 8% of girls report bullying others. Second, 18% of deprived children (i.e., those eligible for free school meals) report bullying others compared to 11% non-deprived children. Third, 21% of children with SEN reported bullying behaviour in contrast with 9% children without SEN. In order to examine if these differences were statistically significant, multilevel logistic regression models were conducted and the results are reported below.

[Table 2 here]

Multi-level Logistic Regression Models

The baseline model (model 1; Table 3) indicates that 9.1% of the variance in bullying is accounted for by schools before any other child- and school-level variables were included. In model 2 (Table 3), including only child-level predictors of bullying behaviour significantly improved the model, likelihood ratio test: D(9)= 974, $p <$ 0.001, and explained an additional 1.4% of school-level variance in bullying behaviour. Gender, deprivation, ethnicity and SEN were all found to be significant predictors of self-reported bullying behaviour. Specifically, boys were more likely to report bullying behaviour compared to girls, deprived children were more likely to report bullying compared to non-deprived children, and children from Black ethnic groups were more likely to report bullying compared to children from White backgrounds. Finally, children with a SEN classification were more likely to report bullying others compared to their peers without a SEN classification.

In model 3 (Table 3), including demographic school-level predictors significantly improved the model, D(6) = 41.73, $p < 0.001$, explaining an additional 0.8% of school-level variance. The only significant school-level predictor in model 3

was school deprivation, such that as the proportion of deprived children in the school increases, there was an increased likelihood of children reporting bullying behaviour (over and above child-level FSM status). The pattern of significant child-level predictors remained unchanged from model 2.

The inclusion of school climate in model 4 (Table 3), again significantly improved the model, $D(1) = 110.41$, $p < 0.001$, explaining an additional 2.5% of variance, over and above the variance explained by child- and school-level demographic factors. School climate was a significant independent predictor of bullying behaviour, such that less positive perceptions of school climate was associated with greater self-reported bullying behaviour. The pattern of child- and school-level characteristics remained unchanged with the addition of year group, which was now also a significant independent predictor of bullying behaviour, children in Year 4 were likely to report greater bullying behaviour compared to their older peers in Year 5.

[Table 3 here]

Multi-level Logistic Regression Models: Exploring Child X School Interactions

Two additional models were also conducted to explore interactions between child- and school-level variables. In model 5A (Table 4), the incremental predictive power of child- by school-level demographic interactions were examined over and above the main effects. Specifically, this model explored whether children's individual demographic features in combination with school-level demographic characteristics predicted bullying behaviour. Including demographic interaction significantly improved the model, $D(8) = 30.93$, $p < 0.001$, explaining an additional 0.2% of variance over and above model 4 with child- and school-level main effects

(see Table 4). The only interaction term that independently predicted bullying behaviour was the child deprivation by school deprivation interaction, such that for non-deprived children the likelihood of reporting being a bully decreased with decreasing school-level deprivation. However, deprived children reported engaging in bullying irrespective of their school-level deprivation (see Figure 1).

Including child by school climate interactions (model 5B; Table 4) did not significantly improve the model, $D(9) = 5.03$, $p = 0.083$, and none of the interaction terms were significant (see Table 4).

[Table 4; Figure 1 here]

Finally, sensitivity analysis was conducted by excluding the special educational schools ($n = 8$) and single sex school ($n = 1$). Results remained unchanged.

Discussion

The current study examined a number of child demographic factors as well as malleable and non-malleable school-level factors to better understand the predictors of bullying behaviour across a large number of primary schools. Given much of bullying at this age takes place at school, it is important to understand both the independent influence of different school characteristics on the likelihood of bullying, as well as the combination of school- and child-level characteristics. Findings showed that both child- and school-level variables independently and in combination predicted children's bullying behavior. Specifically, boys, deprived children, those from Black ethnic groups, children with SEN and those from the younger year group

were more likely to report bullying others. Over and above these child-level factors, increased school deprivation and poor school climate also predicted greater bullying behaviour.

The current study also explored whether school-level factors moderate the association between child-level factors and bullying. Only the interaction between child deprivation and school deprivation was significant, such that deprived children were more likely to report bullying behaviour regardless of the degree of deprivation of their school, while non-deprived children were more likely to report engaging in bullying behaviour in schools with increased school-level deprivation. That is, being in a high-deprivation school is a risk factor for bullying only for children that come from non-deprived background. Untangling why this occurs requires further work, but it is possible that being a child from a non-deprived background in a otherwise deprived school sets up a peer group disparity or power imbalance that precipitates bullying behaviours. It would be interesting to examine other peer-related outcomes (e.g. friendship quality, victimisation) to determine if this phenomenon is specific to bullying. This finding suggests that in order to understand the impact of deprivation on bullying behaviour within a school it is crucial to take into account not only the degree of school deprivation but also the deprivation level of the individual child.

School climate also emerged as an important predictor of bullying behavior. The role of school climate for bullying behaviour has been examined in a number of previous studies (e.g., Baker, 1998; Ma, 2002; Nansel et al., 2001) and has been established as being relevant for other related outcomes, such as mental health (Guerra et al., 2011). The current study's findings lend further support for this line of research. Current findings demonstrated that school climate is an important factor for understanding bullying in primary school over and above any child-level

characteristics and non-malleable school factors, highlighting the robust role played by school climate for peer relationships. Importantly, there were no significant interactions between school climate and child-level factors suggesting that the link with school climate is the same for all children in the school, regardless of their background of individual differences. It is important to note, however, that the current study is not able to determine the directionality of the findings between school climate and bullying, so it may be that children report poor school climate because of the degree of bullying in the school or, alternatively, poor school climate may be a factor driving bullying behaviours (Kasen et al., 2004). Further research exploring the impact of interventions to improve school climate on the incidence of bullying behaviour for all students will be well placed examine the pattern of directionality between these constructs.

Given the power of the current study to detect significant effects both at the child- and school-level, it is notable that school size, school gender balance, ethnicity, SEN status and language all did not significantly independently predict bullying behaviour in late primary school. This lends some support to other research with smaller samples of children that have also failed to find a significant association between these school composition factors and bullying (e.g., Saarento et al., 2013; Whitney & Smith, 1993).

Limitations

Although the current study has a number of strengths, notably a large sample of primary schools, a broad range of both child- and school-level indices, and an examination of the combined influence of child-level and school-level factors, there are several limitations to this work. First, the study's design was cross-sectional precluding an investigation of how child- and school-level factors may predict

bullying behavior over time. As noted above, the directionality of influence between school climate and bullying behavior is unable to be determined from the current data.

Second, the measure of bullying comprised only a single self-report item, 'I bully others', with two response options ('sometimes' and 'always') collapsed. There was also no description of bullying provided to participants and a particular timeframe was not specified. While this is a clear limitation of the current study, using a single item to assess bullying behaviour has been previously employed in the extant literature, especially in large scale national studies investigating bullying (e.g., Bradshaw et al., 2009; Nansel et al., 2001). Furthermore, the frequency of children's self-reported bullying in the current study (12% of children report engaging in bullying at least sometimes) is comparable to the frequency of self-reported bullying reported in the literature (between 8% and 15% in late primary school/middle school pupils (e.g., Guerra et al., 2011; Nansel et al., 2001). Nonetheless, a valid concern when using a single bullying item is that it may not have been sensitive to the nuances of different forms that bullying behaviour may take, such as gossip, verbal bullying, and even cyber-bullying. Indeed, certain behaviours are more commonly perceived as bullying (i.e., physical bullying and name-calling, more male-typical bullying) compared to others (e.g., gossiping, exclusion) and may have resulted in girls under-reporting bullying behaviours in the current study. Our results did show that boys reported more bullying than girls. However, this gender difference in the reporting of bullying behaviour is a consistent feature of the bullying literature, even in those studies using more comprehensive self-reported bullying questionnaire measures (e.g., Pepler Jiang, Craig, & Connolly, 2008; Crick & Grotpeter, 1995), as well as single item bullying measures (e.g., Nansel et al., 2001), and peer-rated bullying nomination measures (e.g., Boulton & Smith, 1994). The fact that the current study

also found this consistent gender difference using a highly abbreviated measure of bullying using only two categories of response (never vs. sometimes/always) lends support to the accuracy of both the single item and the response options. Nevertheless, further research using a large sample in conjunction with a more detailed measure of bullying behaviour is clearly needed, and would allow for greater clarity on the association between child- and school-level characteristics and different forms of bullying behaviour in children.

Lastly, while the sample is large and representative of the wider population within participating schools, it does include greater number of children from deprived socio-economic circumstances compared to all English primary schools. This makes it possible that the prevalence of bullying in the current study is an overestimate. However, given that socio-economic status is controlled for in the analyses, we expect that the results pertaining to the child and school characteristics are robust.

Implications

The current findings have potential implications for the growing literature on how best to target school interventions to tackle bullying behavior (Smith, Ananiadou, & Cowie, 2003) and highlight the importance of targeting interventions, to both high-risk children and high-risk schools. In general, children from schools with a high proportion of children from more deprived backgrounds and with poorer school climate are at greatest risk of bullying behaviours. This suggests that promoting positive school climate through universal, whole-school approaches may be beneficial (Bosworth & Judkins, 2014). In addition, based on the current study, it is clear that identifying the children that may be at risk of engaging in bullying behavior would be supported by considering not just the characteristics of the child (gender, deprivation, etc.) but also their relation to the wider school context (especially in terms of relative

deprivation; e.g., Napoletano, Elgar, Saul, Dirks, & Craig, 2015). Future research using a similar approach might also investigate the interactions between social and cognitive individual characteristics such as cognitive ability, peer acceptance and school characteristics in predicting bullying and victim experiences. As such, this study may help to improve our ability to integrate whole-school and targeted anti-bullying programs, taking into account the school and child interactions that are associated with bullying, to allow more effective use of resources.

References

Baker, J. A. (1998). Are we missing the forest for the trees? Considering the social context of school violence. *Journal of School Psychology*, *36*(1), 29-44. doi:10.1016/S0022-4405(97)00048-4

Battistich, V., & Hom, A. (1997). The relationship between students' sense of their school as a community and their involvement in problem behaviors. *American Journal of Public Health*, *87*(12), 1997-2001.

Bosworth, K., Espelage, D. L., & Simon, T. R. (1999). Factors associated with bullying behavior in middle school students. *The Journal of Early Adolescence, 19*(3), 341-362. doi:10.2105/AJPH.87.12.1997

Bosworth, K., & Judkins, M. (2014). Tapping into the power of school climate to prevent bullying: One application of schoolwide positive behavior interventions and supports. *Theory Into Practice*, *53*(4), 300-307. doi:10.1080/00405841.2014.947224

Boulton, M. J., & Smith, P. K. (1994). Bully/victim problems in middle-school children: Stability, self-perceived competence, peer perceptions and peer acceptance. *British Journal of Developmental Psychology*, *12*(3), 315-329. doi.10.1111/j.2044-835X.1994.tb00637.x

Bowes, L., Arseneault, L., Maughan, B., Taylor, A., Caspi, A., & Moffitt, T. E. (2009). School, neighborhood, and family factors are associated with children's bullying involvement: A nationally representative longitudinal study. *Journal of the American Academy of Child & Adolescent Psychiatry*, *48*(5), 545-553. doi:10.1097/CHI.0b013e31819cb017

Bradshaw, C., Sawyer, A., & O'Brennan, L. (2009). A social disorganization perspective on bullying-related attitudes and behaviors: The influence of

school context. *American Journal of Community Psychology*, *43*(3-4), 204-220. doi:10.1007/s10464-009-9240-1

Bradshaw, C. P., Waasdorp, T. E., & Johnson, S. L. (2015). Overlapping verbal, relational, physical, and electronic forms of bullying in adolescence: Influence of school context. *Journal of Clinical Child & Adolescent Psychology*, *44*(3), 494-508. doi:10.1080/15374416.2014.893516

Bradshaw, C. P., Waasdorp, T. E., & Leaf, P. J. (2012). Effects of School-Wide Positive Behavioral Interventions and Supports on Child Behavior Problems. *Pediatrics*, *130*(5), e1136-e1145. doi:10.1542/peds.2012-0243

Brault, M.-C., Janosz, M., & Archambault, I. (2014). Effects of school composition and school climate on teacher expectations of students: A multilevel analysis. *Teaching and Teacher Education*, *44*, 148-159. doi:10.1016/j.tate.2014.08.008

Cook, C. R., Williams, K. R., Guerra, N. G., Kim, T. E., & Sadek, S. (2010). Predictors of bullying and victimization in childhood and adolescence: A meta-analytic investigation. *School Psychology Quarterly*, *25*(2), 65. doi:10.1037/a0020149

Crick, N. R., & Grotpeter, J. K. (1995). Relational aggression, gender, and social-psychological adjustment. *Child Development*, *66*(3), 710-722. doi:http://www.jstor.org/stable/1131945

Deighton, J., Tymms, P., Vostanis, P., Belsky, J., Fonagy, P., Brown, A., . . . Wolpert, M. (2013). The development of a school-based measure of child mental health. *Journal of Psychoeducational Assessment*, *31*(3), 247-257. doi:10.1177/0734282912465570

Department for Education. (2009). *Schools, Pupils and their Characteristics, January 2009*. London: Stationery Office. Retrieved from

http://webarchive.nationalarchives.gov.uk/20120504203418/http:/education.gov.uk/rsgateway/sc-schoolpupil.shtml.

Espelage, D. L., & Swearer, S. M. (2003). Research on school bullying and victimization: What have we learned and where do we go from here? *School Psychology Review, 32*(3), 365-383.

Fink, E., Begeer, S., Hunt, C., & de Rosnay, M. (2014). False-belief understanding and social preference over the first 2 years of school: A longitudinal study. *Child Development, 85*(6), 2389-2403. doi:10.1111/cdev.12302

Fisher, H. L., Moffitt, T. E., Houts, R. M., Belsky, D. W., Arseneault, L., & Caspi, A. (2012). Bullying victimisation and risk of self harm in early adolescence: Longitudinal cohort study. *British Medical Journal, 344*. doi:10.1136/bmj.e2683

Glew, G. M., Fan, M., Katon, W., Rivara, F. P., & Kernic, M. A. (2005). Bullying, psychosocial adjustment, and academic performance in elementary school. *Archives of Pediatrics & Adolescent Medicine, 159*(11), 1026-1031. doi:10.1001/archpedi.159.11.1026

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry, 38*(5), 581-586. doi:10.1111/j.1469-7610.1997.tb01545.x

Guerra, N. G., Williams, K. R., & Sadek, S. (2011). Understanding bullying and victimization during childhood and adolescence: A mixed methods study. *Child Development, 82*(1), 295-310. doi:10.1111/j.1467-8624.2010.01556.x

Hale, D. R., Patalay, P., Fitzgerald-Yau, N., Hargreaves, D. S., Bond, L., Görzig, A., ... & Viner, R. M. (2014). School-level variation in health outcomes in

adolescence: analysis of three longitudinal studies in England. *Prevention Science*, *15*(4), 600-610. doi:10.1007/s11121-013-0414-6

Hawker, D. S. J., & Boulton, M. J. (2000). Twenty years' research on peer victimization and psychosocial maladjustment: A meta-analytic review of cross-sectional studies. *Journal of Child Psychology and Psychiatry, 41*(4), 441-455. doi:10.1111/1469-7610.00629

Hobbs, G., & Vignoles, A. (2010). Is children's free school meal 'eligibility' a good proxy for family income? *British Educational Research Journal, 36*(4), 673-690. doi:10.1080/01411920903083111

Kärnä, A. (2013). Effectiveness of the KiVa antibullying program: Grades 1–3 and 7–9. *Journal of Educational Psychology, 105*(2), 535-551. doi:10.1037/a0030417

Karna, A., Voeten, M., Little, T. D., Poskiparta, E., Alanen, E., & Salmivalli, C. (2011). Going to scale: a nonrandomized nationwide trial of the KiVa antibullying program for grades 1-9. *Journal of Consulting Clinical Psychology, 79*(6), 796-805. doi:10.1037/a0025740

Kasen, S., Berenson, K., Cohen, P., & Johnson, J. G. (2004). The effects of school climate on changes in aggressive and other behaviors related to bullying. In D. L. Espelage & S. M. Swearer (Eds.), *Bullying in American schools: A social-ecological perspective on prevention and intervention* (pp. 187-210). New Jersey: Lawrence Erlbaum Associates.

Khoury-Kassabri, M., Benbenishty, R., Avi Astor, R., & Zeira, A. (2004). The contributions of community, family, and school variables to student victimization. *American Journal of Community Psychology, 34*(3-4), 187-204. doi:10.1007/s10464-004-7414-4

Kuperminc, G. P., Leadbeater, B. J., & Blatt, S. J. (2001). School social climate and individual differences in vulnerability to psychopathology among middle school students. *Journal of School Psychology, 39*(2), 141-159. doi:10.1016/S0022-4405(01)00059-0

Lickona, T., & Davidson, M. L. (2003). School as a caring community Profile-II (SCCP II). *Washington, DC: The Character Education Partnership*.

Ma, X. (2002). Bullying in middle school: Individual and school characteristics of victims and offenders. *School Effectiveness and School Improvement, 13*(1), 63-89. doi:10.1076/sesi.13.1.63.3438

Melby, J., Conger, R., Book, R., Rueter, M., Lucy, L., Repinski, D., . . . Ames, I. (1993). *The Iowa Family Interaction Rating Scales: Iowa Youth and Families Project. 4*. Iowa State University.

Nansel, T. R., Overpeck, M., Pilla, R. S., Ruan, W. J., Simons-Morton, B., & Scheidt, P. (2001). Bullying behaviors among US youth: Prevalence and association with psychosocial adjustment. *JAMA, 285*(16), 2094-2100. doi:10.1001/jama.285.16.2094

Napoletano, A., Elgar, F. J., Saul, G., Dirks, M., & Craig, W. (2015). The view from the bottom: Relative deprivation and bullying victimization in canadian adolescents. Journal of Interpersonal Violence. first published on May 18, 2015. doi:10.1177/0886260515585528

Olweus, D., & Limber, S. P. (2010). Bullying in school: evaluation and dissemination of the Olweus bullying prevention program. *American Journal of Orthopsychiatry, 80*(1), 124-134. doi:10.1111/j.1939-0025.2010.01015.x

Pepler, D., Jiang, D., Craig, W., & Connolly, J. (2008). Developmental trajectories of bullying and associated factors. *Child Development, 79*(2), 325-338. doi:10.1111/j.1467-8624.2007.01128.x

Saarento, S., Garandeau, C. F., & Salmivalli, C. (2015). Classroom- and school-level contributions to bullying and victimization: A review. *Journal of Community & Applied Social Psychology, 25*(3), 204-218. doi:10.1002/casp.2207

Saarento, S., Kärnä, A., Hodges, E. V. E., & Salmivalli, C. (2013). Student-, classroom-, and school-level risk factors for victimization. *Journal of School Psychology, 51*(3), 421-434. doi:10.1016/j.jsp.2013.02.002

Salmivalli, C. (2010). Bullying and the peer group: A review. *Aggression and Violent Behavior, 15*(2), 112-120.

Smith, P. (2010). Bullying in primary and secondary schools. In S. R. Jimerson, S. M. Swearer, & D. L. Esplage (Eds.), *Handbook of bullying in schools: An international perspective* (pp. 137-150). New York: Routledge.

Smith, P. K., Ananiadou, K., & Cowie, H. (2003). Interventions to reduce school bullying. *Canadian Journal of Psychiatry*. *Revue Canadienne de Psychiatrie*, *48*(9), 591-9. doi:10.1177/070674370304800905

StataCorp. (2011). Stata Statistical Software: Release 12. College Station, TX: StataCorp LP.

Stevens J. P. (1992). *Applied multivariate statistics for the social sciences* (2nd edition). Hillsdale, NJ:Erlbaum.

Takizawa, R., Maughan, B., & Arseneault, L. (2014). Adult health outcomes of childhood bullying victimization: evidence from a five-decade longitudinal british birth cohort. *American Journal of Psychiatry, 171*(7), 777-784. doi:10.1176/appi.ajp.2014.13101401

Vervoort, M. M., Scholte, R. J., & Overbeek, G. (2010). Bullying and victimization among adolescents: The role of ethnicity and ethnic composition of school class. *Journal of Youth and Adolescence, 39*(1), 1-11. doi:10.1007/s10964-008-9355-y

Waasdorp, T. E., Pas, E. T., O'Brennan, L. M., & Bradshaw, C. P. (2011). A multilevel perspective on the climate of bullying: Discrepancies among students, school staff, and parents. *Journal of School Violence, 10*(2), 115-132. doi:10.1080/15388220.2010.539164

Whitney, I., & Smith, P. K. (1993). A survey of the nature and extent of bullying in junior/middle and secondary schools. *Educational Research, 35*(1), 3-25. doi:10.1080/0013188930350101

Wolke, D., Woods, S., Bloomfield, L., & Karstadt, L. (2000). The association between direct and relational bullying and behaviour problems among primary school children. *Journal of Child Psychology and Psychiatry, 41*(8), 989-1002. doi:10.1111/1469-7610.00687

Wolke, D., Woods, S., Stanford, K., & Schulz, H. (2001). Bullying and victimization of primary school children in England and Germany: Prevalence and school factors. *British Journal of Psychology, 92*(4), 673-696. doi:10.1348/000712601162419

Wolpert, M., Deighton, J., Patalay, P., Martin, A., Fitzgerald-Yau, N., Demir, E., . . . Frederikson, N. (2011). Me and my school: Findings from the National Evaluation of Targeted Mental Health in Schools. Nottingham: DFE. Retrieved from: https://www.ucl.ac.uk/ebpu/docs/publication_files/tamhs_report

Table 1

School characteristics (n = 648)

	M (*SD*)	Range
Size (number of pupils)	304.00 (135.85)	29 – 1212
Gender (% girls)	48.45 (4.57)	.00 – 60.00
Deprivation (% FSM)	18.73 (12.93)	.00 – 87.50
Ethnicity (% BME)	22.67 (28.04)	.00 – 100
SEN %	29.71 (15.37)	.00 – 100
EAL %	17.12 (25.35)	.00 –100
School climate	11.77 (0.83)	7.08 – 13.81

Note: FSM = Free School Meals, BME = Black and Minority Ethnic, SEN = Special Educational Needs, EAL = English as an Additional Language

Table 2

Proportions of children responding "never" and "sometimes/always" to the bullying behaviour questionnaire as a function of child-level demographic characteristics

		Never (%)	Sometimes/Always (%)
Gender	Male	82.98	17.02
	Female	92.48	7.52
Deprivation (FSM)	Not Eligible	89.42	10.58
	Eligible	81.94	18.06
Ethnicity	White	88.28	11.72
	Asian	86.92	13.08
	Black	82.23	17.77
	Mixed	86.44	13.56
	Other/Not known	89.37	10.63
SEN	No SEN	90.90	9.10
	SEN	79.41	20.59
EAL	No	87.94	12.06
	Yes	86.54	13.46

Note: FSM = Free School Meals, SEN = Special Educational Needs, EAL = English as an Additional Language

Table 3

Results of multilevel regression models testing impact of child- and school-level characteristics on bullying behaviour

	Model 1 Baseline		Model 2 Child-level Predictors		Model 3 School-level Predictors		Model 4 School Climate	
Parameter Estimates	Estimate (SE)	OR (SE)	Estimate (SE)	OR (SE)	Estimate (SE)	OR (SE)	Estimate (SE)	OR (SE)
Child-level								
Intercept	-2.04 (.03)**	.13 (.004)	-1.61 (.10)**	.20 (.02)	-2.03 (.41)**	.13 (.05)	2.57 (.56)**	13.05 (7.33)
Gender (female)	–	–	-.86 (.05)**	.42 (.02)	-.86 (.05)**	.42 (.02)	-.86 (.04)**	0.42 (.02)
Deprivation	–	–	-.42 (.05)**	1.52 (.07)	.35 (.05)**	1.43 (.07)	.37 (.05)**	1.44 (.07)
Ethnicity (Asian)	–	–	.17 (.10)	1.18 (.11)	.09 (.10)	1.10 (.11)	.12 (.10)	1.13 (.12)
Ethnicity (Black)	–	–	.42 (.09)**	1.53 (.14)	.33 (.09)**	1.39 (.13)	.32 (.09)**	1.38 (.13)
Ethnicity (Mixed)	–	–	.14 (.10)	1.15 (.12)	.10 (.10)	1.10 (.11)	.08 (.10)	1.09 (.11)
Ethnicity (Other)	–	–	-.05 (.16)	.95 (.16)	-.12 (.17)	.89 (.15)	-.09 (.16)	.91 (.15)
SEN	–	–	.75 (.04)**	2.12 (.09)	.72 (.04)**	2.06 (.09)	.72 (.04)**	2.06 (.09)
EAL	–	–	-.06 (.08)	.94 (.07)	-.17 (.08)	.84 (.07)	-.18 (.08)	.83 (.07)
Year Group	–	–	-.16 (.06)	.85 (.05)	-.15 (.06)	.86 (.05)	-.28 (.06)**	.75 (.04)
School-level								
Size	–	–	–	–	-.03 (.02)	.97 (.02)	-.04 (.02)	.96 (.02)
Gender^{+}	–	–	–	–	.06 (.08)	1.06 (.08)	.10 (.07)	1.10 (.08)
Deprivation^{+}	–	–	–	–	.10 (.03)**	1.11 (.03)	.11 (.03)**	1.12 (.03)
Ethnicity^{+}	–	–	–	–	-.01 (.03)	.99 (.03)	-.04 (.03)	.96 (.02)
SEN^{+}	–	–	–	–	.03 (.02)	1.03 (.03)	.01 (.02)	1.01 (.0)
EAL^{+}	–	–	–	–	.06 (.03)	1.06 (.03)	.07 (.03)	1.07 (.03)
School climate	–	–	–	–	–	–	-.39 (.04)**	.68 (.02)

Log-likelihood	-8546.51	-8059.34	-8038.48	-7983.27
ICC	.091	.077	.069	.044
Random effects	.57 (0.03)	.52 (.03)	.49 (.03)	.39 (.03)

Note: SEN = Special Educational Needs, EAL = English as Additional Language; [+] School composition characteristics are calibrated such that a unit represents 10%
* $p < 0.01$, ** $p < 0.001$

Table 4

Results of multilevel regression models testing impact of child- and school-level characteristics on bullying behaviour

Model 5a Child X School Interactions			Model 5b Child X School Climate Interactions		
Parameter Estimates	Estimate (SE)	OR (SE)	Parameter Estimates	Estimate (SE)	OR (SE)
Child-level			Child-level		
Intercept	2.70 (1.00)		Intercept	4.78 (1.48)	
Gender (female)	-1.33 (.66)	.26 (.17)	Gender (female)	-1.79 (.68)**	.17 (.11)
Deprivation	.75 (.10)**	2.12 (.21)	Deprivation	.15 (.71)	1.17 (.82)
Ethnicity (Asian)	-.26(.21)	.76 (.17)	Ethnicity (Asian)	-1.15 (1.42)	.32 (.45)
Ethnicity (Black)	.44 (.20)	1.56 (.31)	Ethnicity (Black)	.36 (1.37)	1.44 (1.97)
Ethnicity (Mixed)	.27 (.17)	1.31 (.23)	Ethnicity (Mixed)	-.94 (1.49)	.39 (.58)
Ethnicity (Other)	-.64 (.36)	.52 (.19)	Ethnicity (Other)	.14 (2.75)	1.16 (3.18)
SEN	.72 (.11)**	2.06 (.23)	SEN	.03 (.67)	1.03 (.69)
EAL	.02 (.15)	1.02 (1.5)	EAL	.52 (1.11)	1.68 (1.88)
Year Group	-.29 (.06)**	.75 (.04)	Year Group	-1.12 (.86)	.34 (.28)
School-level			School-Level		
Size	-.05 (.02)	.96 (.02)	Size	-.04 (.02)	.96 (.02)
Gender	.01 (.01)	1.06 (.09)	Gender	.01 (.01)	1.01 (.01)
Deprivation	.17 (.03)**	1.19 (.03)	Deprivation	.01 (.00)**	1.01 (.00)
Ethnicity	-.00 (.00)	.95 (.03)	Ethnicity	-.00 (.00)	1.00 (.00)
SEN	.00 (.00)	1.00 (.03)	SEN	.00 (.00)	1.00 (.00)
Language	.08 (.03)	1.08 (.03)	Language	.01 (.00)	1.01 (.00)

School climate	-.39 (.04)**	.68 (.02)	School climate	-.48 (.06)**	.62 (.04)
Interactions			Interactions		
Gender X School gender[+]	.10 (.13)	1.10 (.15)	Gender X SC	.08 (.06)	1.08 (.06)
Deprivation X School deprivation[+]	-.17 (.04)**	.85 (.03)	Deprivation X SC	.02 (.06)	1.02 (.06)
Ethnicity (Asian) X School ethnicity[+]	.06 (.03)	1.06 (.04)	Ethnicity (Asian) X SC	.11 (.12)	1.12 (.14)
Ethnicity (Black) X School ethnicity[+]	-.02 (.03)	.98 (.03)	Ethnicity (Black) X SC	-.00 (.12)	1.00 (.12)
Ethnicity (Mixed) X School ethnicity[+]	-.05 (.04)	.95 (.03)	Ethnicity (Mixed) X SC	.09 (.13)	1.09 (.14)
Ethnicity (Other) X School ethnicity[+]	.10 (.06)	1.10 (.06)	Ethnicity (Other) X SC	-.02 (.24)	.98 (.23)
SEN X School SEN[+]	-.00 (.03)	1.00 (.03)	SEN X SC	.06 (.06)	1.06 (.06)
EAL X School EAL[+]	-.05 (.03)	.95 (.03)	EAL X SC	-.06 (.10)	.94 (.09)
-	-		Year Group X SC	.07 (.07)	1.07 (.08)
Log-likelihood	-7967.81		Log-likelihood	-7980.76	
ICC	.042		ICC	.043	
Random effects	.38 (.03)			.39 (.03)	

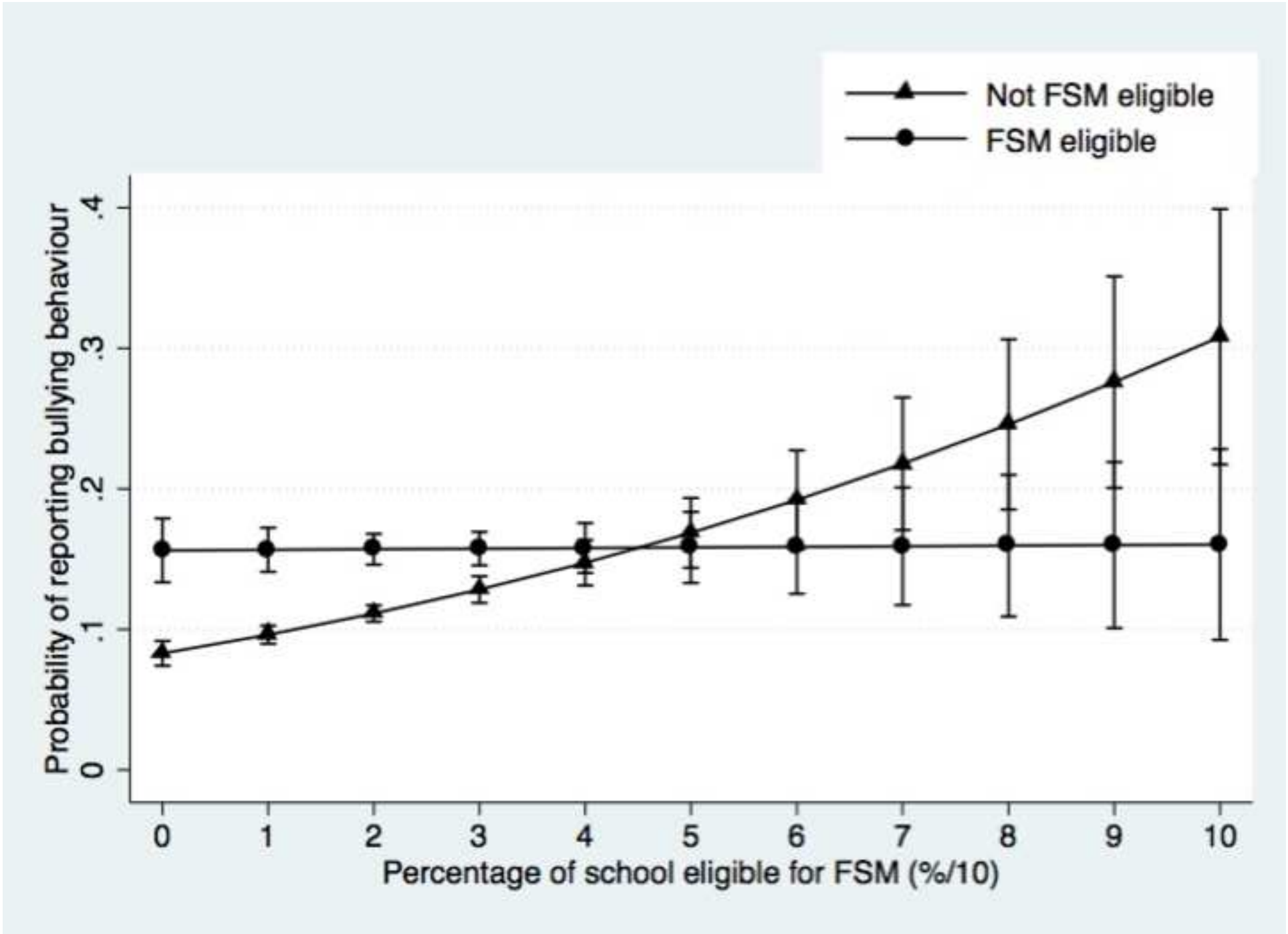
Note: SEN = Special Educational Needs, EAL = English as Additional Language, SC = School Climate; [+] School composition characteristics are calibrated such that a unit represents 10%
* $p < 0.01$, ** $p < 0.001$

Figure headings

Figure 1: Predicted probabilities of reporting bullying behaviour, showing interaction between child- and school-level deprivation.

Note: This figure represents fixed effects only.

Figure


Not FSM eligible
FSM eligible
Probability of reporting bullying behaviour
0
.1
.2
.3
.4
0
1
2
3
4
5
6
7
8
9
10
Percentage of school eligible for FSM (%/10)